

WHAT IS CLAIMED IS:

1. A turbine engine component comprising:

an airfoil portion having a span;

at least one cooling passageway in said airfoil portion extending from a root portion of said airfoil portion to a tip portion of said airfoil portion; and

a plurality of turbulation promotion devices in said at least one cooling passageway, said turbulation promotion devices having a P/e which varies along the span of said airfoil portion, where P is the pitch between adjacent turbulation promotion devices and e is the height of each said turbulation promotion device.

2. A turbine engine component according to claim 1, wherein the P/e ratio of said turbulation promotion devices is lower in a midspan region of said at least one cooling passageway than in an end region of said at least one cooling passageway.

3. A turbine engine component according to claim 2, wherein said P/e ratio is in the range of from 5 to 30 in said midspan region.

4. A turbine engine component according to claim 2, wherein said P/e ratio is in the range of from 5 to 30 in said end region.

5. A turbine engine component according to claim 1, wherein said P/e ratio is lower in a midspan region of said at least one cooling passageway and is higher in non-midspan regions of said at least one cooling passageway.

6. A turbine engine component according to claim 1, wherein said pitch in a region near said root portion varies from 0.050 to 0.500 inches.

7. A turbine engine component according to claim 1, wherein said pitch in a region near said root portion varies from 0.350 to 0.362 inches.

8. A turbine engine component according to claim 1, wherein said pitch in a mid-span region varies from 0.050 inches to 0.500 inches.

9. A turbine engine component according to claim 1, wherein said pitch in a mid-span region varies from 0.110 to 0.180 inches.

10. A turbine engine component according to claim 1, wherein said pitch in a region near said tip portion varies from 0.050 inches to 0.500 inches.

11. A turbine engine component according to claim 1, wherein said pitch in region near said tip portion varies from 0.180 inches to 0.290 inches.

12. A turbine engine component according to claim 1, wherein said height varies from 0.004 inches to 0.050 inches.

13. A turbine engine component according to claim 1, wherein said height varies from 0.008 inches to 0.010 inches.

14. A turbine engine component according to claim 1, wherein said turbine blade has a plurality of cooling passages, each said cooling passage having a plurality of turbulation promotion devices, and said turbulation promotion devices having a P/e ratio which varies along the span of the airfoil portion.

15. A turbine engine component according to claim 1, wherein said component comprises a turbine blade.

16. A turbine engine component according to claim 1, wherein said at least one cooling passageway has a diameter D and the ratio of e/D is in the range of 0.05 to 0.30.

17. A method for manufacturing a turbine engine component comprising:

forming a component having an airfoil portion with a root portion, a tip portion and a span; and

fabricating at least one cooling passage in said component having a plurality of turbulation promotion devices having a P/e ratio which varies along the span of said component, where P is the pitch between adjacent ones of said turbulation promotion devices and e is the height of a respective turbulation promotion device.

18. A method according to claim 17, wherein said fabricating step comprises providing a first region of each said cooling passage adjacent said root portion of said airfoil portion with turbulation promotion devices having a first P/e ratio and providing a mid span region of each said cooling passage with turbulation promotion devices having a second P/e ratio which is lower than said first P/e ratio.

19. A method according to claim 18, wherein said fabricating step comprises providing a third region of each said cooling passage adjacent said tip portion of said airfoil portion with turbulation promotion devices having a third P/e ratio which is greater than said second P/e ratio.

20. A method according to claim 19, wherein said fabricating step further comprises providing said third P/e ratio so that it is greater than said first P/e ratio.

21. A method according to claim 17, wherein said turbine component forming step comprises forming a turbine blade.

22. A method according to claim 17, wherein said turbine component forming step comprises forming said turbine engine component by a casting technique.